

Abstract of the Disclosure

An impurity precipitation region is formed by introducing an impurity, e.g., oxygen, into a silicon substrate or a silicon layer and thermally treating it, and performing high selectivity anisotropic etching with the precipitation region used as a micro mask. Thus, a cone (conic body or truncated conic body having an annular leading end) having a very sharp and slender needle shape with an aspect ratio of about 10 and a diameter of about 10 nm to 30 nm in the vicinity of its leading end is obtained with the micro mask used as the top. By forming an insulation layer and a drive electrode such as a gate electrode around the cone, the cone can be used for a field emission device, a single electron transistor, a memory device, a high frequency switching device, a probe of a scanning type microscope or the like.